

Amendment to the Claims:

1. (Cancelled)

2. (Currently Amended) The system of claim 19, wherein the calculating the motion vectors includes, with the one [[ore]] or more processors:

spatially extending the centerline in the most recently acquired noisy image with the centerline of a previously acquired noisy image;

matching the centerline in the most recently acquired noisy image;

estimating the motion vectors based on the matching of the centerlines.

3. (Previously Presented) The system of claim 2, wherein combining the most recently acquired noisy image with the plurality of previously acquired registered noisy images includes, with the one or more processors:

applying the motion vectors to the full most recently acquired noisy image such that the guide-wire tip and the vessel walls of the most recently acquired noisy image are registered with the guide-wire tip and the vessel walls of the plurality of previously acquired registered noisy images and the background of the most recently acquired noisy image and the background in the plurality of previously acquired noisy images are misaligned such that in combining the registered most recently acquired noisy image with the plurality of previously acquired registered noisy images, the vessel walls are enhanced and the background blurred.

4. (Previously Presented) The system of claim 19, further comprising:

a user operated control by which a user activates the image acquisition device to acquire noisy images, starts the one or more processors to start registering and combining each most recently acquired image with the previously acquired registered noisy images, and stops the one or more processors to stop the series of images.

5. (Cancelled)

6. (Previously Presented) The system of claim 19, wherein the one or more processors are further programmed to:

zoom the displayed Region Of Interest.

7. (Previously Presented) The system of claim 19, wherein combining the most recently acquired noisy image with the previously acquired image includes superimposing the registered most recently acquired image on at least one previously acquired registered noisy image.

8. (Previously Presented) The system of claim 7, wherein the at least one previously acquired registered noisy image includes a plurality of the previously acquired registered noisy images which have been combined.

9. (Previously Presented) The system of claim 19, wherein a contrast agent is periodically injected into the vessel such that in the most recently acquired noisy image after injection of the contrast agent, the tip is obscured by the contrast agent and wherein the combining step includes with the one or more processors, combining the most recently acquired noisy image with at least one previously acquired noisy image in which the centerline of the tip is depicted.

10. (Currently Amended) The system of claim 19, wherein calculating the motion vectors with the one [[ore]] or more processors is further based on a breathing characteristic and a heart pulse characteristic.

11-13. (Cancelled)

14. (Currently Amended) A medical examination imaging apparatus comprising:

a diagnostic diagnostic imaging device that acquires the sequence of noisy medical images in real time; and

a viewing system according to claim 19 which processes and displays series of images.

15. (Currently Amended) A computer executable image processing method for displaying in a medical viewing system a sequence of medical images that represents moving and/or positioning a guide-wire in a blood vessel, the method comprising:

acquiring a sequence of noisy images of the blood vessel and the guide-wire as the guide-wire moves in the blood vessel;

processing the sequence of noisy images in real time, the processing comprising:

detecting automatically the guide-wire tip;

identifying a skeleton of the guide-wire tip including comprising a series of pixels along a centerline of the tip;

determining a field of motion vectors based on said skeleton;

registering automatically the guide-wire tip with respect to a prior reference image of the sequence of noisy images based on the field of motion vectors;

integrating temporally by averaging pixel intensity over a plurality of the noisy images of the sequence of noisy images that are registered to the reference image, thereby enhancing the blood vessel and blurring background; and

displaying the processed sequence.

16. (Currently Amended) A non-transitory computer readable storage medium comprising instructions for carrying out a computer executable image processing method for displaying in a medical viewing system a sequence of medical images that represents moving and/or positioning a guide-wire in a blood vessel, the method comprising:

acquiring an original live sequence of noisy images called a live sequence;

starting an automatic device to deliver diluted contrast agent into the blood vessel;

processing the live sequence of noisy images in real time, the processing comprising for each most recently acquired noisy image of the live sequence:

detecting automatically the guide-wire tip;
generating a skeleton of the guide-wire tip comprising a series of pixels along a centerline of the tip;
generating field of motion vectors based on said skeleton;
registering automatically the guide-wire tip with respect to a prior reference image from the live sequence based on the field of motion vectors;
enhancing the guide-wire and vessel walls while blurring background by integrating temporally by averaging pixel intensity over the most recently acquired image registered to the reference image and a plurality of preceding noisy images of the live sequence registered to the reference image, thereby enhancing the blood vessel adjacent the tip, blurring the background, and enhancing a line corresponding to the tip centerline in the integrated most recently acquired and preceding noisy images; and
displaying the processed live sequence.

17. (Previously Presented) A method for positioning a guide-wire in a blood vessel, which guide-wire has a guide-wire tip that is contrasted with respect to the guide-wire, the method comprising:

operating a medical viewing system to acquire an original sequence of noisy images called a live sequence;
processing the live sequence of images in real time, the processing comprising:

detecting the guide-wire tip, yielding a skeleton of the guide-wire tip comprising a series of pixels along a centerline of the guide-wire tip, and field of motion vectors based on the skeleton;

delivering diluted contrast agent into the blood vessel;

registering the guide-wire tip with respect to a reference based on the field of motion vectors;

integrating temporally by averaging pixel intensity over several images to enhance the images of the guide-wire and the vessel walls while blurring background in registered images; and

displaying a live sequence of processed images.

18. (Currently Amended) The computer executable image processing method ~~readable storage medium~~ of claim 15, wherein the integrating step including integrating the centerline of the tip to generate a ridge or line depicting the guide wire.

19. (Previously Presented) A medical viewing system for displaying a sequence of medical images that depict moving and/or positioning an imageable tip of a guide-wire in a blood vessel, the system including:

one or more processors programmed to:

acquire a sequence of noisy images of a region of interest of a patient depicting the imageable tip of the guide-wire, the blood vessel in which the guide-wire is disposed, and background outside the blood vessel,

detect the guide-wire tip in each acquired noisy image,

define a series of pixels along a center line of the tip,

calculate a field of motion vectors defining motion of the tip in each most recently acquired noisy image relative to a previously acquired reference noisy image,

register the guide-wire tip with respect to the previously acquired reference noisy image based on the field of motion vectors,

combine the most recently acquired noisy image of the sequence with a plurality of previously acquired noisy images of the sequence which have been registered to the reference noisy image such that the tip of the guide-wire and walls of the blood vessel adjacent the guide-wire tip are enhanced while the background is blurred, and the center lines of the tip and the most recently and previously acquired noisy images define a line; and

a display which displays each most recently acquired noisy image combined with the plurality of previously acquired noisy images in real time to provide the sequence of medical images depicting movement of the guide-wire through the blood vessel with the vessel walls enhanced.